



# STUDY OF FOUR O 'CLOCK FLOWER (MIRABILIS JALAPA) BY SPECTROSCOPIC TOOL

S. L. Bhattar<sup>1</sup> | P. P. Kulkarni<sup>1</sup>

Department of Chemistry, Gogate-Jogalekar College, Ratnagiri-415612 Maharashtra, India.

## ABSTRACT

India has a very rich diversity and plant kingdom is certainly a treasure house of diverse natural product. Once such product from nature is the dye. In this study, natural colorants mainly flavonoids and carotenoids present in the *Mirabilis Jalapa*, (four o'clock plants). The dye potential of the colorant obtained from the *Mirabilis Jalapa* evaluated by colouring pure cotton and wool. The strength of dye was found in 100% methanol. The findings reveal that *Mirabilis Jalapa* can serve as a potential source of natural colorant which can be used in textile industry for dying purpose. In this study we checked the alternative hazardous and toxic chemicals dye and also find various application such as best indicator for acid base indicator.

**KEY WORDS:** *Mirabilis Jalapa*, Dye, Methanol etc.

## 1. INTRODUCTION:

Natural dyes can be used on the most type of material or fibre but the level of success in terms of fastness and clarity of colour varies considerably. Users of natural dyes however tend to also use natural fibres and so we will look in more details in this group. *Mirabilis jalapa* L family Nyctaginaceae is commonly known as four o'clock flower or clavillia. It is a quick growing much-branched perennial herb with erect, angular, distinctly jointed stem, swollen at the nodes. Leaves deep green, ovate and flowers in-group of three flowers with five green bracteoles, surrounding the perianth, usually yellow, crimson, white or variegated and opening in the evening. Perianth lobes five, gamophyllous, stamens five with unequal filaments. Carpel one, unilocular, superior ovary with a single base ovule, a nectariferous disc surrounds the ovary. Fruit achene surrounded by a

leathery, ribbed, persistent perianth [1-5]. Phytochemical investigation of the extracts from this plant showed that it is rich in many active compounds including triterpenes, proteins, flavonoids, alkaloids, and steroids. Alanine, alpha-amyrins, arabinose, beta-amyrins, campesterol, daucosterol, and dopamine were the other compounds reported from extracts of this plant [6]. It has been also reported that the water extract of *M. jalapa* tubers, containing higher amounts of flavonoids, exhibits antimicrobial and antioxidant activities. [7] In this study we observed the reaction of flower extract in different pH conditions and compared natural indicator to commercial indicators with measurement of pH. As coloring matter flavonoids, anthocyanins are present in flowers of *Mirabilis jalapa* and are pH sensitive [8]; it was hypothesized that, this flower extract could be utilized as an indicator for different types of acid base titrations.

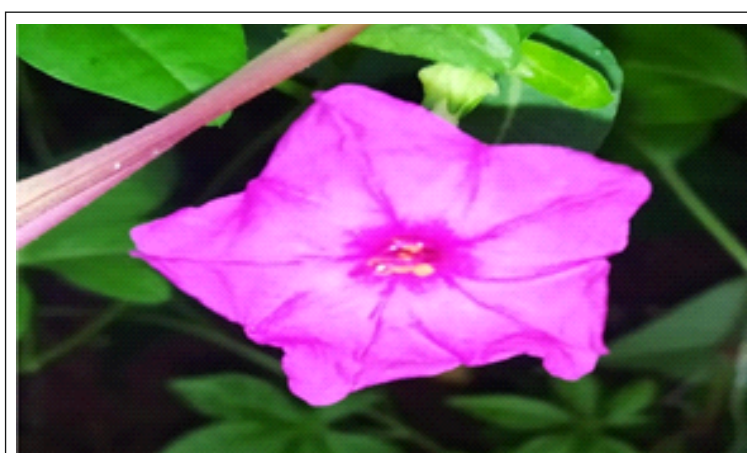


Fig.1: Flower of *Mirabilis Jalapa*

## 2. MATERIALS AND METHODS:

### 2.1 Chemicals:

Chemicals, and solvents of analytical grade were purchased from HiMedia.

### 2.2 Plant material:

*Mirabilis jalapa* L was collected from locally grown flower gardens in campus of the Gogate-Jogalekar college, Ratnagiri

### 2.3 Extraction and fractionation:

The flowers collected were thoroughly washed with tap water and finally rinsed with distilled water. The flowers were shade dried for 1 week and powdered. Approximately 5 mg of sample was extracted with 500 mL of 80% methanol for

24 hours. Extraction was repeated and the extracts were pooled and filtered through Whatman number 1 filter paper. The filtrate was concentrated under reduced pressure in a rotary vacuum evaporator.

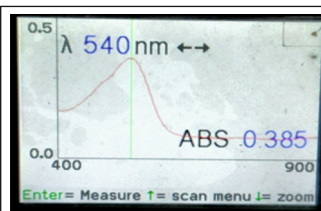
## 3. CHARACTERIZATION:

Ultraviolet-Visible (UV-Vis) absorption spectra is used to analyse the type of pigments and can be used as an inference of the pigment concentration through the position of absorption peak and intensity, respectively [9]. UVV spectra of *Mirabilis Jalapa* L recorded at wavelength 400 to 900 nm. The spectra were taken with a reference of solvents of the dye extraction. However, in order to investigate the stability of the extracted dyes, the extracted dyes were re-measured after seven days they had been stored.

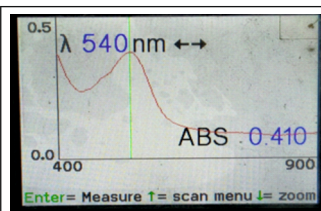
Sr. No.	SOLVENT	QUNTITY OF SOLVENT IN cm <sup>3</sup>	WEIGHT OF CRUSH COMPOUND IN GRAM	ABSORBANCE (550 nm)	ABSORBANCE (550 nm) (After 24 hrs)	ABSORBANCE (550 nm) (After 48 hrs)	ABSORBANCE (550 nm) (After 72 hrs)
1	ETHANOL	0.8	0.5	0.385	0.187	0.145	0.124
2	ACETONE	0.8	0.5	0.410	0.117	0.182	0.207

#### 4. RESULT AND DISCUSSION:

The absorbance spectra of Mirabilis Jalapa L extraction for protic polar solvents like ethanol and acetone shows a peak in the range of 500 nm to 700 nm, which indicates the presence of red to blue anthocyanin compound [10-12]. These peaks are observed in the UV-Vis absorption spectra for dye solution extracted using various solvents for Mirabilis Jalapa L, which is shown in Fig. 2. And Fig. 3. The Mirabilis Jalapa L in acetone and ethanol showed absorption peak at 550 nm which is almost the same result that reported in the previous report [9].



**Fig. 2: Absorption spectrum of Mirabilis Jalapa L In Ethanol**



**Fig. 3: Absorption spectrum of Mirabilis Jalapa L**

#### 5. CONCLUSION:

This work revealed that the degradation of the Mirabilis Jalapa L extraction dyes varies in acetone, ethanol, respectively. The variation peaks of absorption spectra values may imply the electrostatic interaction between the polar solvent and polar solutes. In this study, it shows that anthocyanin degradation is affected by the solvent used during extraction process. Hence, the results emphasize that anthocyanin compound are relatively unstable and often undergoes degradation during fabrication process and storage. Generally, the anthocyanins and their derivatives show a broad absorption band in the range of visible light attributed to charge transfer transition. The solvents studied, consistent with the assignment of the transition to  $\pi-\pi^*$ .

#### REFERENCES:

- I. Swarup V, Garden Flowers, National Book Trust, India, pp.104-105.
- II. Rendle AB, Gymnosperms and Monocotyledons: The Classification of Flowering Plants, IInd Ed, Vol I, Vikas Publishing House, pp. 337-339.
- III. Shulka P, Misra SP, An Introduction to Taxonomy of Angiosperms, Vikas Publishing House, pp. 497-499.
- IV. Subrahmanyam NS, Laboratory Manual of Plant Taxonomy, Vikas Publishing House, pp.359,409,563,609.
- V. Mahajan N S, Jadhav R L, Pimpodkar N V, Dias R J and Garje S B, Journal of Pharmacy Research, Vol.1, Issue 2, Oct- December 2008
- VI. J Gogoi , K S Nakhuru , R S. Policegoudra , P Chattopadhyay , A K Rai , V Veer, Journal of Traditional and Complementary Medicine 6 (2016) 41-47
- VII. Hajji M, Jarraya R, Lassoued I, Masmoudi O, Damak M, Moncef N. GC/MS and LC/MS analysis, antioxidant and antimicrobial activities of various solvent extracts from Mirabilis jalapa tubers. Process Biochem. 2010;45:1486-1493.
- VIII. Kirtikar KR, Basu BD, Indian Medicinal Plants, IInd Edition, Vol III, International Book Distributors, Dehra Dun, 1996, pp.1584.
- IX. P. Gu, D. Yang, X. Zhu, H. Sun, and J. Li, "Fabrication and characterization of dye-sensitized solar cells based on natural plants," Chem. Phys. Lett., vol. 693, pp. 16–22, 2018.
- X. G. Calogero et al., "Efficient dye-sensitized solar cells using red turnip and purple wild sicilian prickly pear fruits.," Int. J. Mol. Sci., vol. 11, no. 1, pp. 254–267, 2010.
- XI. R. Ramamoorthy, N. Radha, G. Maheswari, S. Anandan, S. Manoharan, and R. Victor Williams, "Betain and anthocyanin dye-sensitized solar cells," J. Appl. Electrochem., vol. 46, no. 9, pp. 929–941, 2016.
- XII. R. Ramanarayanan, N. P., N. C. V., and S. S., "Natural dyes from red amaranth leaves as light-harvesting pigments for dyesensitized solar cells," Mater. Res. Bull., vol. 90, no. Supplement C, pp. 156–161, 2017.